1. A method of maintaining processing pressure in a single-wafer vacuum processing chamber of a semiconductor wafer processing machine having an exhaust volume communicating with a high vacuum pump, the method comprising:

providing one of the chambers of the machine with a replaceable protective shield configured to substantially protect, from deposition caused by a process in said chamber, the walls of said chamber and of a gas flow conductance path that extends from said chamber to the exhaust volume, and to partially impede gas flow from said chamber through the gas flow conductance path to the exhaust volume such that the processing pressure of gas in said chamber is distinctly higher than the pressure in the exhaust volume.

2. The method of claim **1** further comprising:

controlling the flow of processing gas into said chamber so as to maintain the processing pressure in the chamber.

3. The method of claim **1** further comprising:

providing a controller programmed to control the processing of wafers in the chamber, including controlling the supply of processing gas into the chamber such that gas flows from the chamber, through the path and to the exhaust volume, and such that the processing pressure in the chamber is distinctly higher than the pressure in the exhaust volume.

4. The method of claim **1** wherein said chamber is a first one of the chambers and the method further comprises:

controlling the flow of processing gas into the first one of the chambers and of processing gas into a second one of the chambers so as to maintain the processing pressure of gas in the first one of the chambers at a pressure that is distinctly higher than the pressure in the second one of the chambers and in the exhaust volume, and so that the pressure in the second one of the chambers is higher than the pressure in the exhaust volume.

5. The method of claim **4** further comprising:

providing the second one of the chambers of the machine with a replaceable protective shield configured to substantially protect, from deposition caused by a process in said second one of the chambers, the walls thereof and of a gas flow conductance path that extends therefrom to the exhaust volume, and to partially impede gas flow from said second one of the chambers through its respective gas flow conductance path to the exhaust volume to a degree less than the gas flow is impeded through its respective path from said first one of the chambers to the exhaust volume, such that the processing pressure of gas in said second one of the chambers is distinctly higher than the pressure in the exhaust volume.

6. The method of claim **1** further comprising:

providing a semiconductor wafer processing machine having the plurality of single-wafer processing chambers, a high vacuum pump, and the at least one exhaust volume communicating with the high vacuum pump.

7. The method of claim **1** further comprising:

providing each of at least two of the chambers with a gas flow conductance path to the exhaust volume, at least one of which chambers being provided with the replaceable protective shield; and

providing the controller programmed to control the processing of wafers in the chambers by controlling the supply of process gas into each of said two of the chambers such that gas flows from the chamber, through the respective path and to the exhaust volume, and such that a chamber that is provided with said shield is maintained at a higher controlled processing pressure than another of said at least two chambers.

8. The method of claim **1** further comprising:

providing each of at least two of the chambers with a replaceable protective shield configured to partially restrict the flow from the chamber through a gas flow conductance path to the exhaust volume;

one of said two chambers being configured for performance of a relatively high pressure process on a wafer therein and being provided with a shield set configured to provide relatively low gas flow conductance through its respective path, and the other of said two chambers being configured for the performance of a relatively low pressure process therein and being provided with a shield set configured to provide relatively high gas flow conductance through its respective path.

9. The method of claim **1** further comprising:

providing each of at least three of the chambers with a replaceable protective shield configured to partially restrict the flow from the chamber through a gas flow conductance path to the exhaust volume;

a first one of said three chambers being configured for performance of a relatively high pressure process on a wafer therein and being provided with a first shield set configured to provide relatively low gas flow conductance through its respective path;

a second one of said three chambers being configured for the performance of a relatively low pressure process therein and being provided with a second shield set configured to provide relatively high gas flow conductance through its respective path;

a third one of said three chambers being provided with either the first or the second shield set; and

providing the controller programmed to control the processing of wafers in the chambers, including controlling the supply of process gas into each of said three chambers such that processing pressure in the first one of the chambers is distinctly higher than the processing pressure in the second of said chambers and the exhaust volume, the pressure in the third one of the chambers is distinctly different than in either the first or the second ones of the chambers and the pressures in the second and third one of the chambers are distinctly higher than the pressure in the exhaust volume.

10. The method of claim **1** further comprising:

providing each of at least two of the chambers with a gas flow conductance path to the exhaust volume;

providing each of said at least two of the chambers with a replaceable protective shield configured to substantially protect walls of the chamber and the gas flow conductance path from deposition from the chamber, and to partially impede the gas flow from the respective chamber through the respective gas flow conductance path to the exhaust volume; and

providing the controller programmed to control the processing of wafers in the chambers by controlling the supply of process gas into each of said two of the chambers such that gas flows from the chamber, through the respective path and to the exhaust volume, and such that each chamber is maintained at a different controlled processing pressure that is higher than the pressure at the exhaust volume.

11. The method of claim **1** further comprising:

providing each of at least two of the chambers with a gas flow conductance path to the exhaust volume;

providing each of said at least two of the chambers with a replaceable protective shield configured to substantially protect walls of the chamber and the gas flow conductance path from deposition from the chamber, and to partially impede the gas flow from the respective chamber through the respective gas flow conductance path to the exhaust volume, the shield of the at least two chambers being differently configured to differently impede the gas flow from the respective chamber.

12. The method of claim **1** wherein:

the providing of the protective shield includes providing a nested set of shields including an outer shield adjacent the walls of the chamber and having an opening therethrough communicating with the gas flow conductance path, and an inner shield spaced from the outer shield so as to form an annular gap between the inner and outer shields that communicates with the opening, the gap and the opening forming a passage from the chamber to the gas flow conductance path.

13. The method of claim **1** wherein:

the providing of the protective shield includes providing a nested set of shields that includes an outer shield adjacent the walls of the chamber that provides line-of-sight protection of walls of the chamber from deposition from the chamber and having an opening therethrough communicating with the gas flow conductance path, and an inner shield spaced from the outer shield so as to form an annular gap between the inner and outer shields that communicates with the opening and so as to require at least three specular reflections off shield surfaces of atoms of coating material moving from the chamber to the opening.

14. The method of claim **1** further comprising:

injecting a flow of processing gas into said chamber through a hole in the shield.

15. The method of claim **1** further comprising:

injecting a flow of processing gas into said chamber through a hole in the shield; and

sensing pressure in said chamber through a hole in the shield.

16. A set of replaceable protective deposition shields for a PVD processing chamber comprising:

an outer shield having a generally cylindrical portion and a gas outlet opening therethrough and a gas inlet opening therethrough;

an inner shield having a generally cylindrical portion of a diameter less than that of the generally cylindrical portion of the outer shield and having an inlet opening therethrough for alignment with the inlet opening of the outer shield; and

the inner shield being configured to mount in a nested relationship with the outer so as to form an annular gap between the inner and outer shields that communicates with the opening and that extends sufficiently from the opening so as to require at least three specular reflections off shield surfaces of atoms of coating material moving from the chamber to the opening when the set is installed in a process chamber and a PVD process is being performed in the process chamber.

17. Two sets of replaceable protective deposition shields of claim **16**, each set being differently configured so as to differently impede gas flow from the chambers.

18. A PVD apparatus comprising the protective set of replaceable deposition shields of claim **16** and further comprising :

a plurality of single-wafer processing chambers;

a high vacuum pump;

an exhaust volume communicating with the high vacuum pump; and

a gas flow conductance path extending from at least one of the chambers to the exhaust volume; and

the protective set of replaceable deposition shields being installed in the at least one of the chambers with the opening in the outer shield aligned with the gas flow conductance path.

19. The PVD apparatus of claim **18** further comprising:

a processing gas supply connected to the at least one of the chambers; and

a controller programmed to control the processing of wafers in the chambers by controlling the supply of process gas into at least said one of the chambers such that gas flows from the chamber, through the path and to the exhaust volume, and such that the chamber is maintained at a controlled processing pressure that is higher than the pressure at the exhaust volume.

20. The PVD apparatus of claim **18** further comprising:

a gas flow conductance path extending from at least two of the chambers to the exhaust volume; and

a protective set of replaceable deposition shields being installed in the at least two of the chambers with the opening in the outer shield of the set aligned with the gas flow conductance path from the chamber.

21. The PVD apparatus of claim **20** further comprising:

a processing gas supply connected to each of the at least two of the chambers; and

a controller programmed to control the processing of wafers in the chambers by controlling the supply of process gas into each of the at least two of the chambers such that gas flows from the chamber, through the path and to the exhaust volume, and such that each of the at least two chambers is maintained at a different controlled processing pressure that is higher than the pressure at the exhaust volume.

22. A PVD apparatus comprising:

a plurality of single-wafer processing chambers bounded by chamber walls;

a high vacuum pump;

an exhaust volume communicating with the high vacuum pump;

a gas flow conductance path extending from at least one of the chambers to the exhaust volume;

a protective deposition shield installed in the at least one of the chambers configured to substantially protect walls of the chamber and the gas flow conductance path from deposition from the chamber, and to partially impede the gas flow from the chamber through the gas flow conductance path to the exhaust volume so that the chamber can be operated at a higher pressure than that of the exhaust volume; and

a controller programmed to control the processing of wafers in the chambers by controlling the supply of process gas into said one of the chambers such that gas flows from the chamber, through the path and to the exhaust volume, and such that the chamber can be maintained at a controlled processing pressure that is higher than the pressure at the exhaust volume.

23. The PVD apparatus of claim **22** further comprising:

a processing gas supply connected to the at least one of the chambers; and

the controller being programmed to control the processing of wafers in the chambers by controlling the supply of process gas into at least said one of the chambers such that gas flows from the chamber, through the path and to the exhaust volume, and such that the chamber is maintained at a controlled processing pressure that is higher than the pressure at the exhaust volume.

24. The PVD apparatus of claim **22** further comprising:

a gas flow conductance path extending from at least two of the chambers to the exhaust volume;

a protective deposition shield being installed in the at least two of the chambers configured to substantially protect walls of the respective chambers and the gas flow conductance paths from deposition from the chambers, and to partially impede the gas flow from the chambers through the gas flow conductance paths to the exhaust volume so that each chamber can be operated at a higher pressure than that of the exhaust volume; and

the controller being programmed to control the processing of wafers in the chambers by controlling the supply of process gas into each of said two of the chambers such that gas flows from the chamber, through the respective path and to the exhaust volume, and such that each chamber is maintained at a different

controlled processing pressure that is higher than the pressure at the exhaust volume.

25. The PVD apparatus of claim **24** further comprising:

a plenum having an index plate lying in a vertical plane and mounted to rotate on a horizontal axis therein, a plurality of wafer holders being spaced around the axis on the index plate;

the plurality of single-wafer processing chambers being spaced at intervals around the plenum for alignment with holders on the index plate;

a plurality of gas flow conductance paths each extending from each of the at least two of the chambers to the exhaust volume; and

each of the at least two chambers having a protective deposition shield installed therein configured to substantially protect walls of the chamber and the gas flow conductance path from deposition from the chamber, and to partially impede the gas flow from the chamber through the gas flow conductance path to the exhaust volume so that the at least two chambers can be operated at different pressures, at least one being higher than that of the exhaust volume.

26. The PVD apparatus of claim **22** further comprising:

a wafer processing module having the at least one chamber therein;

a transfer module removably connected to the processing module and having the exhaust volume therein to which the chamber of the processing module is connected through the flow conductance path; and

the controller being programmed to control the processing of wafers in the chamber in the processing module by controlling the supply of process gas into said chamber such that gas flows from the chamber, through the path and to the exhaust volume, and such that the chamber is maintained at a controlled processing pressure that is higher than the pressure at the exhaust volume.

27. The PVD apparatus of claim **26** wherein:

the transfer module includes a transfer arm moveable to pass a wafer between the transfer module and the processing module through the flow conductance path;

the protective deposition shield being moveable in response to the controller to so partially impede the gas flow from the chamber through the gas flow conductance path to the exhaust volume during processing in the processing module and away from the gas flow path when a wafer is being passed therethrough.

28. The PVD apparatus of claim **27** further comprising:

a baffle moveable with the shield into and out of the gas flow path.

29. The PVD apparatus of claim **22** further comprising:

at least two wafer processing modules, each having a chamber therein;

a transfer module removably connected to each processing module and having the exhaust volume therein;

each processing module having a flow conductance path connecting the chamber thereof to the exhaust volume;

the chamber of each processing module having a shield therein configured to substantially protect walls of the chamber and the respective gas flow conductance path from deposition from the chamber, and to partially impede the gas flow from the respective chamber through the respective gas flow conductance path to the exhaust volume; and

the controller being programmed to control the processing of wafers in the chambers in the processing modules by controlling the supply of process gas into said chambers such that gas flows from the respective chamber, through the respective path and to the exhaust volume, and such that the pressure in one chamber is maintained at a controlled processing pressure that is higher than the pressure in another chamber.

30. The PVD apparatus of claim **29** further comprising:

the transfer module includes a transfer arm moveable to pass a wafer between the transfer module and the processing modules through the respective flow conductance paths thereof;

the protective deposition shields in each processing module being moveable in response to the controller to so partially impede the gas flow from the chamber through the gas flow conductance path to the exhaust volume during processing in the processing module and away from the gas flow path when a wafer is being passed therethrough;

one of the processing modules being configured to perform a process therein at a pressure that is higher than that of the other processing module and provided with a baffle moveable with the shield therein into and out of the gas flow path.